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The Structure of Nominal Constructions in Polish Sign Language (PJM): A Corpus-based Study[1]

Abstract

The syntax of nominal constructions has so far attracted relatively little attention in the rapidly growing literature on sign languages. In Poland, there have been virtually no studies addressing the topic. The goal of the present paper is to offer an overview of the nominal syntax of PJM (*polski język migowy*), the visual-spatial language of the Polish Deaf, which is diachronically and synchronically independent of spoken/written Polish. A key, and novel, aspect of the present proposal is that we base our descriptive model on a detailed investigation of extensive empirical data. For the purposes of this study, we have carefully inspected a sample of video material extracted from the first-ever corpus of PJM that is currently being compiled at the University of Warsaw. An in-depth examination of the data has allowed us to produce a typology of PJM nominal constructions involving adjectives and other adnominal modifiers. The present paper outlines the word-order generalizations that emerge from the analyzed data. We observe that PJM adjectives show a clear tendency to appear in postposition with respect to the head noun, whereas other adnominal modifiers (such as numerals or possessives) most often precede the noun. Additionally, we confront these findings with data on spoken Polish nominals extracted from the National Corpus of Polish.

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Keywords
sign language, PJM, corpus linguistics, nominal syntax, adjectives, word order

Streszczenie
Składni konstrukcji nominalnych poświęcono dotychczas niewiele uwagi w szybko rozwijającej się literaturze z dziedziny lingwistyki migowej. W Polsce nie przeprowadzono dotąd niemal żadnych badań dotyczących tego tematu. Celem niniejszego artykułu jest zaprezentowanie opisu składni konstrukcji nominalnych polskiego języka migowego (PJM), czyli wizualno-przestrzennego języka używanego przez Głuchych w Polsce, odmiennego od polszczyzny pisanej/mówionej zarówno pod względem diachronicznym, jak i synchronicznym. Najważniejszym założeniem referowanego tu badania – odróżniającym je od wielu innych prac dotyczących składni języków migowych – jest wykorzystanie obszernego materiału empirycznego. Na potrzeby niniejszego studium autorzy dokonali przeglądu próby materiału wideo pochodzącego z pierwszego i jedynego korpusu PJM, który jest obecnie tworzony na Uniwersytecie Warszawskim. Wnikliwa analiza pozwoliła na opracowanie typologii konstrukcji nominalnych w PJM – zawierających zarówno przymiotniki, jak i inne modyfikatory. Niniejszy artykuł przedstawia generalizacje dotyczące szyku wyrażeń nominalnych, wyłaniające się z przestudiowanych danych. Autorzy zauważają, że przymiotniki w PJM mają tendencję do występowania w postpozycji względem rzeczownika głównego, podczas gdy inne modyfikatory (takie jak liczebniki lub elementy dzierżawcze) zazwyczaj poprzedzają rzeczownik. Dodatkowo autorzy dokonują analizy porównawczej owych wniosków z danymi dla konstrukcji nominalnych występujących w mówionej polszczyźnie, pozyskanymi z Narodowego Korpusu Języka Polskiego.

Słowa kluczowe
język migowy, PJM, lingwistyka korpusowa, składnia nominalna, przymiotniki, szyk wyrazów

1. Introduction: The PJM corpus

In this paper we present the first corpus-based study of the internal structure of nominal constructions in Polish Sign Language (*polski język migowy*, hereafter PJM). PJM is a natural visual-spatial language used in everyday communication by the Deaf community in Poland. The capital letter in the word *Deaf* is meant to indicate that the community is viewed here as a linguistic minority. PJM emerged around 1817, when the first school for the Deaf was established in Warsaw, and today its number of users is estimated to exceed 50,000. The grammar and lexicon of PJM are radically different from those of spoken Polish but for many decades PJM was deprived of the status of a full-fledged natural language. In recent years, however, this approach has started to change, as is evidenced by a newly passed Polish law on sign language and other means of communication (*Ustawa z dnia 19 sierpnia 2011 r. o języku migowym i innych środkach komunikowania się, Dz.U. z 2011 r. Nr 209, poz. 1243*), which, among other measures, grants the Deaf community new rights concerning interpreting services in contacts with public administration.

Nevertheless, from the linguistic perspective we can still say that PJM is a highly understudied language. Although the first description of PJM was published as early as in 1879 (Hollak and Jagodziński 1879), relatively little has been reported about specific aspects of PJM grammar since then. It was only recently that a number of pioneering studies broadened our understanding of the linguistic system of PJM (see e.g. Farris 1994; Świdziński and Gałkowski 2003; Tomaszewski 2011) but there are still more questions than answers in this area. It should also be noted that much of the existing literature (see e.g. Perlin 1993) has been devoted to signed Polish (the so-called language-sign system, *system językowo-migowy,* hereafter SJM), which is a subcode of spoken Polish, with the exact same grammar and lexicon; this subcode was artificially created to help the Deaf children study and acquire written Polish, and as such it is not of much interest to sign language linguists.

When it comes to PJM, most of the available analyses are based on the intuitions of individual native signers rather than on representative samples of real language usage. This is understandable, of course, considering that PJM has no written form and, until recent developments in video technology, could not be recorded in a convenient way. These days, however, we have a unique opportunity to analyze PJM grammar on the basis of solid empirical data. In 2010 the Section for Sign Linguistics (*Pracownia Lingwistyki Migowej*, PLM, www.plm.uw.edu.pl) at the University of Warsaw began compiling the first-ever large-scale corpus of PJM. This on-going endeavor is aimed at gathering a collection of video data consisting of elicited and spontaneous sign language utterances, produced by signers who either have deaf parents or have used PJM since early school age. In four years of work on this project, the PLM team (which the authors of this paper are members of) has managed to collect more than 400 hours of video showing native signers in natural communication situations. Collection of corpus data proceeds as follows: each corpus session is a meeting between two Deaf informants with a Deaf moderator, who is a PLM collaborator. It lasts 4–5 hours, during which the signers are asked to perform 26 different elicitation tasks. For example, they have to retell a story or a comic strip their partner has not seen, to talk to their partner about various issues related to Deaf Culture, to try and schedule a meeting based on the calendar they are shown on a computer screen or to explain to their partner the path from point A to point B on a map. Five HD cameras record each session: two are placed in front of the informants (in order to record manual and non-manual signs); two are placed above them (in order to record the distance between the body and the hands of the person that is signing) and one is recording the whole room – to show the interactions between informants and the moderator. So far the PLM team has managed to record 92 deaf signers, all of whom consider PJM their first language. Our informants come from all around Poland and the group is controlled for age, sex, region, age of acquisition, social background

and education. For ethical reasons, we record only adult signers (the sign language data we collect cannot be anonymized, which means that, by participating in the recording session, the informants agree to transfer their image rights to the corpus project).

After a recording session is completed, the raw video material must be annotated. The footage is uploaded into the iLex software – a specialized program designed for annotating sign language corpora, developed by Thomas Hanke and colleagues at the University of Hamburg (Hanke and Storz 2008). This software enables multi-tier annotation of sign languages (e.g. glossing, translating, tagging) and allows many annotators to work simultaneously. The annotators working in the PLM team are Deaf or CODA (the acronym stands for *children of Deaf adults* and is commonly used in the literature to refer to hearing signers who acquired sign language from their Deaf parents). They are all fluent not only in PJM but also in spoken Polish. Since the beginning of the project, annotation work has distinguished over 6000 lexemes (types of signs that the Deaf use in their communication) in the recorded material. What is more, we have annotated over 200,000 tokens and inserted more than 170,000 grammatical tags of different kinds. To our knowledge, this makes the PJM corpus one of the the largest annotated sign language corpora in the world and, needless to say, a unique tool for studying PJM grammar. The study reported in the present paper is based on data extracted from this corpus.

2. Nominal structures in sign languages

Although the body of literature on the syntax of sign languages is growing rapidly (see e.g. Pfau, Steinbach and Woll 2012 and the references therein), relatively little attention has so far been paid to the issue of word order within the nominal domain. Most of the few studies that do attempt to analyze the relative ordering of the head noun and its modifiers (see e.g. MacLaughlin 1997; Zhang 2007; Bertone 2010; Neidle and Nash 2012) adhere to the generative approach to phrase structure that has become known as the Determiner Phrase hypothesis (cf. Abney 1987). A key premise of this approach is that the internal structure of the nominal domain is hierarchical, with different kinds of modifiers occupying multiple functional layers projected above the NP. In other words, the existing accounts of the syntax of sign language adnominal modification are, by and large, consistent with Cinque's model of the syntax of adjectives, according to which there is a universal order: DEMONSTRATIVE > NUMERAL > ADJECTIVE > NOUN (where ">" reads as "is likely to precede" – cf. Cinque 1994, 2005).

The goal of the present paper is to test the applicability of the Cinquean theory to the nominal syntax of PJM. We attempt to suggest a plausible model

of the structural skeleton of PJM nominals, taking into account various modifiers that may accompany the head noun. By doing this, we verify the account involving multiple functional phrases located in the region between the NP and DP layers.

For the purposes of the present study, we have analyzed the syntactic properties of nominal expressions used by 10 signers filmed for the PJM corpus project. We have limited the inspected data to two segments of the corpus elicitation scenario, both of them requiring participants to summarize short narratives (a set of Mickey Mouse comic strips and the *Pear Story* film – cf. Chafe 1980). The total number of signed tokens that this material consisted of was 4827. Our in-depth examination of this subset of corpus data has allowed us to produce a comprehensive typology of PJM nominal constructions as well as provide answers to the following research questions:

1. What is the relative ordering of nouns and their modifiers?
2. What is the extent of grammaticalization of those constructions?
3. How complex are nominal constructions?
4. What is the extent of influence from spoken Polish in this regard?

Additionally, we have also analyzed data for spoken Polish from the National Corpus of Polish (*Narodowy korpus języka polskiego*, NKJP). We anticipated that comparing conversational data from the PJM corpus to written Polish would not yield fair results, and so chose instead to analyze spoken language. This has allowed us to view the nominal syntax of PJM in light of an analogous type of data, i.e. sentences produced in spoken Polish in face-to-face communication contexts.

3. Results for PJM

Analyzing a sign language lexeme in terms of its grammatical category (i.e. determining what part of speech it belongs to) is a highly challenging task. This is mostly due to the fact that many signs are systematically ambiguous; out of sentential context, they may be seen as grammatically unmarked. As noted by Schwager and Zeshan (2008), among others, sign language lexemes usually have very general meanings that are specified by the context of the utterance they become part of. In consequence, it will often be difficult to assign a specific grammatical interpretation to each element of a string of signs, although, as a whole, the string will have a clear semantic interpretation. This is also true in PJM, where a single sign may (at least potentially) express a number of different sentential roles (acting as a predicate, argument or adjunct).

Therefore, the analysis of data for the purposes of the present study required extensive annotation of video material, resulting in the singling out of each and every occurrence of a nominal expression. In order to complete this task,

we tagged all signs with respect to their part-of-speech status. This laborious endeavor was necessary as, due to the grammatical underspecification phenomenon mentioned above, the syntactic status of a particular token cannot be inferred on the basis of its gloss (lemma). We distinguished the following constituents of nominal expressions: nouns, adjectives, numerals, possessives and indexical points (which function as demonstratives/determiners in PJM). The annotation had to be performed manually, as video data cannot – for obvious reasons – be analyzed (semi-)automatically in ways analogous to tagging written-language corpora. When analyzing corpus material for the purposes of this study we decided to rely on the annotators' judgments concerning the role of each segment in a particular sentence/phrase. The annotators interpreted individual tokens as verbal, nominal, adjectival, etc., on the basis of their intuitions, which, needless to say, was not fully rigorous but until large scale corpus data analysis can be used to formulate clear morphosyntactic criteria for the delimitation of grammatical classes in PJM, this intuition-based procedure seems to be the best available.

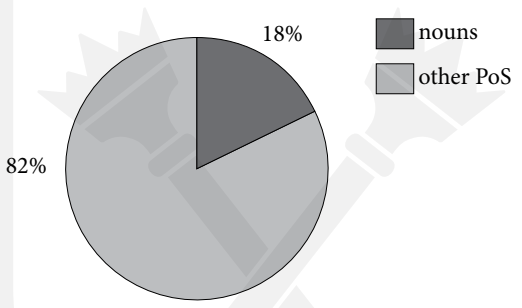

Fig. 1. Percentage of nouns in the PJM material studied (total number of signs: 4,827)

This work allowed us to state what percentage of the lexemes that the selected PJM material was composed of were nouns. The total number of signs that we inspected was 4,827 and it turned out that 887 of them were nouns. Figure 1 shows the proportion of nouns vs. other parts of speech.

Subsequently, we analyzed how many of the identified nouns occured within nominal constructions. Out of the 887 nouns we found, 205 appeared with a modifier (one or more) whereas 682 appeared alone. Figure 2 presents the percentage.

In the next step of the analysis we focused on the complexity of the nominal constructions. Of the 205 nominal constructions of different kinds that we found, 183 consisted of two elements (e.g. noun plus adjective or noun plus numeral), 20 consisted of three elements (e.g. adjective plus two nouns or

noun plus numeral plus adjective) and 2 consisted of four elements (numeral, noun plus two adjectives). Figure 3 illustrates the respective percentages.

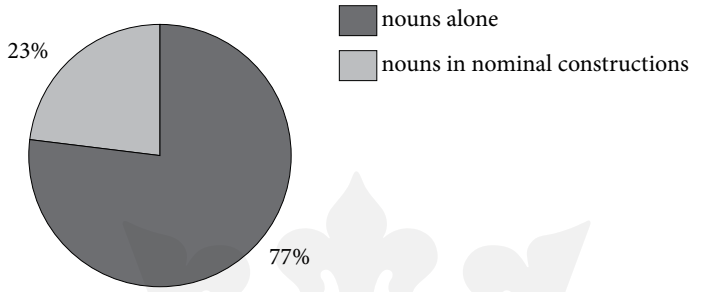

Fig. 2. Percentage of single-element vs. multi-element nominals in the PJM material studied (total number of nominals: 887)

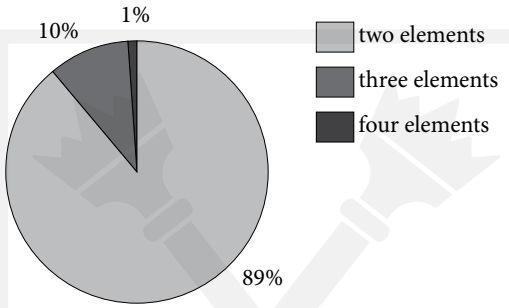

Fig. 3. Complexity of nominal constructions in the PJM material studied (total number of constructions: 205)

We then focused on the different kinds of modifiers that occurred in the 205 nominal constructions, with adjectives, numerals, possessives and demonstratives variously playing the role of modifier. Figure 4 shows which of these types of constructions were more and less common (we use the following abbreviations: N = noun, A = adjective, Num = numeral, Ix = indexical point/demonstrative, Poss = possessive, h = head).

As shown in Figure 4, structures with adjectives were the most common. In total we found 87 such constructions of differing complexity. Figure 5 presents a typology of the adjectival expressions that we identified.

The data shown in Figure 5 also evidences a certain pattern in nominal construction word ordering: in most cases the adjective follows the noun. In specific, in 57 cases the adjective occurred after the noun, while in 30 cases it appeared in preposition (Figure 6 shows the respective percentages). From this data it seems clear that PJM has its own rules of ordering for nominal constitu-

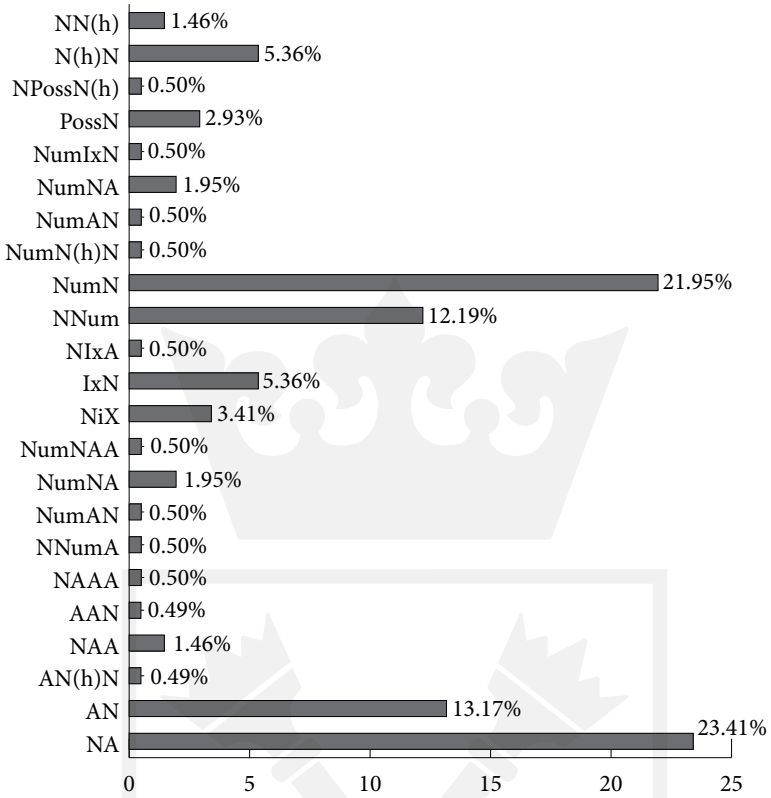

Fig. 4. Percentages of different kinds of nominal constructions in the PJM material studied (in total: 205 constructions)

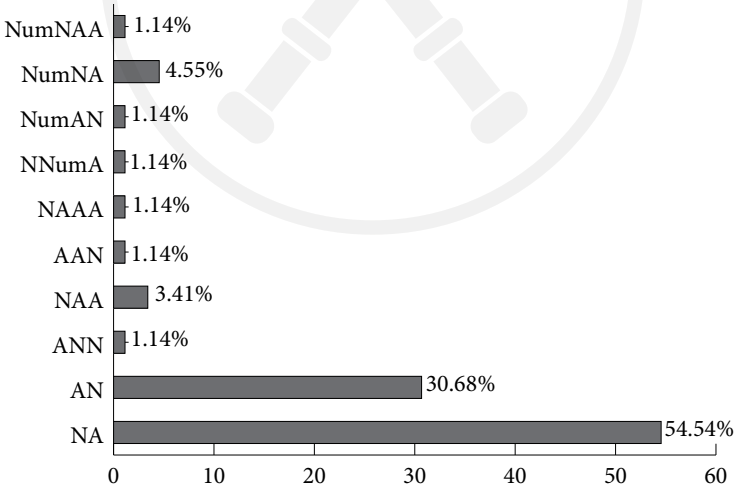

Fig. 5. Nominal constructions with adjectives in the PJM material studied (in total: 87 constructions)

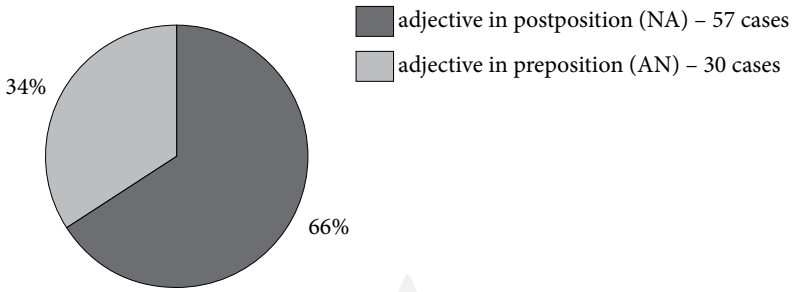

Fig. 6. Percentage and absolute number of constructions with adjectives in preposition and postposition in the PJM material studied (in total: 87 constructions)

ents, since the prevailing word order NA is quite different from the word order tendencies found in spoken Polish (compare to Fig. 13 below).

This conclusion, however, applies only to the nominal constructions with adjectives. Our study reveals that other modifiers (namely, possessives, numerals and demonstratives) are more likely to precede the noun they modify than to follow. Figures 7 and 8 summarize the results we obtained for indexical points and numerals. As for possessives, in all of the 7 possessive constructions

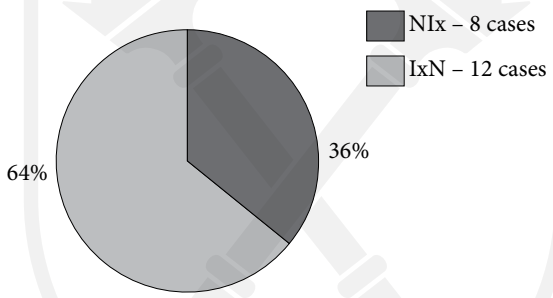

Fig. 7. Percentage and absolute number of constructions with demonstratives in preposition and postposition in the PJM material studied (in total: 20 constructions)

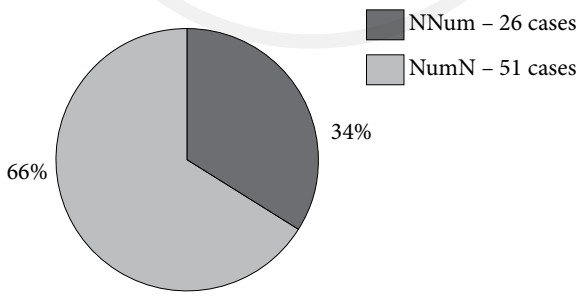

Fig. 8. Percentage and absolute number of constructions with numerals in preposition and postposition in the PJM material studied (in total: 77 constructions)

that we came across, the possessive sign preceded the head noun (i.e. there were no cases of the NPoss ordering).

The data presented above seems to suggest that, in principle, it is possible to apply the Cinquean model to the syntax of PJM nominals. Note that those groups of adnominal modifiers that are generally considered to occupy functional rather than lexical layers in the nominal architecture (i.e. demonstratives, possessives and numerals) tend to precede the head noun in the material that we analyzed. This finding is in line with the DP hypothesis and its later extensions. Although we do not find enough evidence to analyze demonstratives as located in DP (which would imply their linear precedence with respect to possessives and numerals), it has to be noted that demonstratives have been analyzed as base generated in the region below the DP layer also in analyses of many spoken languages (see e.g. Rutkowski 2009). The postnominal placement of adjectives might be viewed as an unexpected result (as it is clearly different from the pattern that prevails in Polish). However, the NA ordering is not an uncommon phenomenon in spoken languages and may be explained within the Cinquean model as resulting from N-raising (see e.g. Rutkowski 2009). Having said that, we also need to notice that the sample we inspected contained very few nominal expressions consisting of more than two elements. Therefore, it is very difficult to say to what extent the relative ordering of different prenominal modifiers with respect to one another has been grammaticalized in PJM. One might possibly argue that the complexity of nominal expressions in PJM is significantly lower than in the case of languages like Polish. This line of reasoning could, in turn, lead to the conclusion that PJM is "simpler" or "less sophisticated" grammatically than Polish. Since such a claim would definitely be contrary to Deaf signers' intuitions, we decided to examine this issue by juxtaposing PJM data with their spoken Polish equivalents.

4. Results for spoken Polish

It should be underlined that sign language data from the PJM corpus cannot be analyzed as equivalent to written texts. The texts that the corpus is composed of are spontaneous utterances produced in face-to-face conversations, without any preparation or revision. In order to find a suitable comparative perspective, we decided to examine a subsection of the *National Corpus of Polish* (NKJP) that contains transcribed samples of spoken language (www.nkjp.uni.lodz.pl/spoken.jsp). The data in question came from conversations recorded for the purposes of the NKJP – cf. Przepiórkowski et al. (2012). When studying this spoken data we asked ourselves the same research questions as when analyzing the PJM data and our analysis proceeded in the same fashion, to facilitate contrastive analysis.

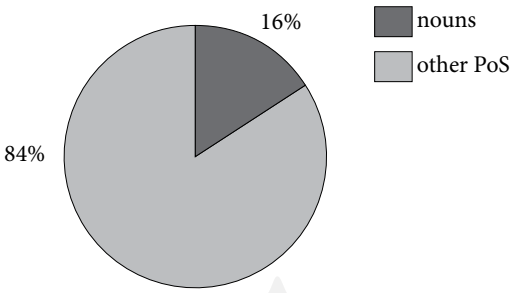

Fig. 9. Percentage of nouns among all segments for spoken Polish (total number of segments: 67,705)

The selected sample that we analyzed consisted of 67,705 segments. Of these, nouns accounted for 10,545 segments. Figure 9 shows the corresponding percentage. It is noteworthy that the ratio of nouns to other parts of speech is very similar in PJM and spoken Polish (compare to Figure 1 above).

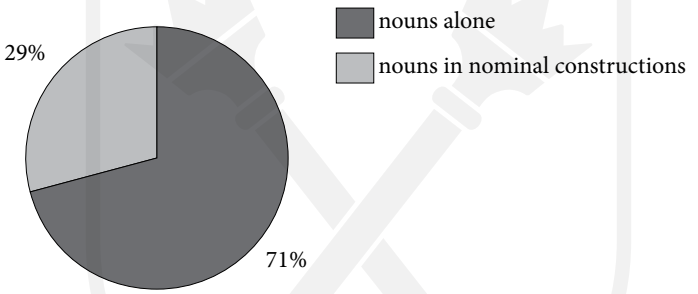

Fig. 10. Percentage of single-element vs. multi-element nominals in spoken Polish (total number of nominals: 10,545)

Next, we focused on nouns only. As in the case of PJM, we checked how many of these appear in nominal constructions. Of the 10,545 nouns that we found, 7,534 stood alone and 3,011 were involved in a nominal construction. This is illustrated in Figure 10. Here the percentages are also very similar for both PJM and Polish (see Figure 2).

The third feature that we investigated was the complexity of nominal constructions in spoken Polish. We classified the 3,011 multi-element nominal constructions that we identified in the corpus into three groups based on the number of constituents. We found 2,554 constructions that consisted of two elements, 405 that consisted of three elements and 22 that consisted of four ele-

ments. We did not find any more complex constructions. Figure 11 shows the corresponding data. Once again the chart in very similar to the corresponding one for PJM (compare to Figure 3 above).

Last but not least, we investigated the placement of adjectival modifiers with respect to the nouns they accompany. Figure 12 presents the percentages of constructions exhibiting various orderings of nouns and adjectives, whereas Figure 13 shows how often adjectives occurred in postposition (542 cases) and in preposition (2,335 cases) with respect to the noun.

Figure 13, for spoken Polish, is particularly interesting to compare to the analogous Figure 6 for PJM data. In PJM adjectives predominantly occur in postposition, whereas in spoken Polish the opposite tendency is found, with adjectives predominantly occurring in preposition with respect to the noun.[2]

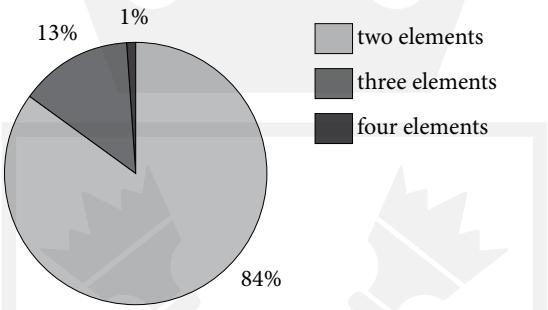

Fig. 11. Complexity of nominal constructions in spoken Polish (total number of constructions: 3,011)

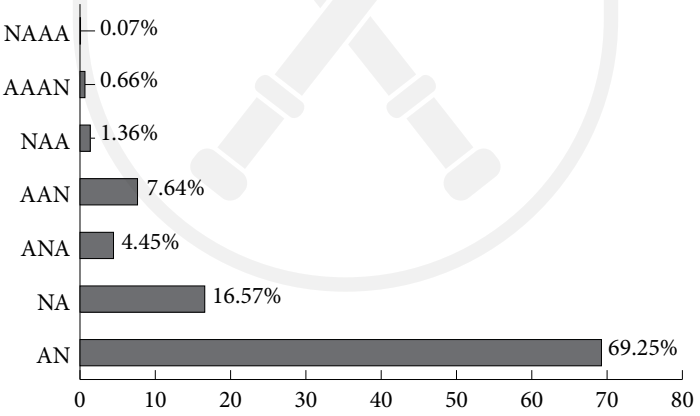

Fig. 12. Nominal constructions with adjectives in spoken Polish (in total: 3,011 constructions)

[2] The postnominal placement of adjectives in spoken Polish is largely limited to the context of so-called classificatory constructions – see e.g. Willim (2000), Rutkowski (2009), Linde-Usiekniewicz (2013).

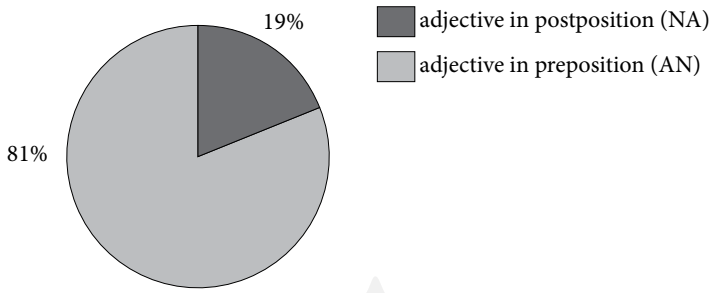

Fig. 13. Percentage of constructions with adjectives in preposition and postposition in spoken Polish (in total: 2877 constructions, after excluding ANA constructions)

Such a clear contrast cannot be accidental. Neither can it be explained as related to the conversational character of the data analyzed. In our opinion, the above observations on the syntax of spoken Polish nominals provide very important support for the following statements concerning PJM:

1. The relative ordering of nouns and their adjectival modifiers has been grammaticalized as NA in PJM.

2. The NA ordering shows that the syntax of PJM has developed independently of the syntax of Polish (which, indirectly, proves PJM's status as an independent natural language).

3. PJM nominal constructions cannot be claimed to be less complex than their Polish equivalents, if one takes into account their conversational nature.

5. Conclusions

The findings of this work on PJM nominal constructions, the first corpus-based study ever to be conducted, support a few interesting conclusions.[3] Firstly, we found that the frequency of complex nominals is roughly the same in PJM as in spoken Polish. This provides evidence for the claim that it is not true that PJM is less complex grammatically (as was assumed for many years), at least in the area of nominal constructions. The second conclusion is that the prevailing pattern of surface word order in PJM is as follows: DEMONSTRATIVE/POSSESSIVE/NUMERAL > NOUN > ADJECTIVE. This shows that PJM has its own rules of ordering nominal constituents, which are significantly different from those found in spoken Polish. In particular, the prevailing PJM word order tendency is NA, while the spoken Polish word order tendency is AN. This can be seen

[3] We realize that the size of the data we base our conclusions on is relatively limited and we plan to verify our findings by analyzing a larger subset of the PJM corpus.

as evidence that in terms of the structure of nominal constructions, Polish has not exerted much influence on PJM. All these preliminary conclusions, of course, are solely based on the broad-based statistical tendencies found in this study, and as such are worthy of more detailed examination.

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